

NASPI Control Room Solutions Task Team Monthly Meeting

**Presenters: Mike Cassiadoro & Jim Kleitsch
March 21, 2018**



Agenda

- I. Introductions
- II. Review meeting minutes from Jan. & Feb. 2018 calls
- III. Review status of CRSTT work products
 - Focus Area Documents
 - Video Event Files
 - Use Case Documents
- IV. Review CSRTT's mission, objectives and goals and continue discussing potential revisions for 2018
- V. Consider topics for discussion at the April 2018 Work Group Meeting
- VI. Adjourn

CRSTT Meeting Minutes Review

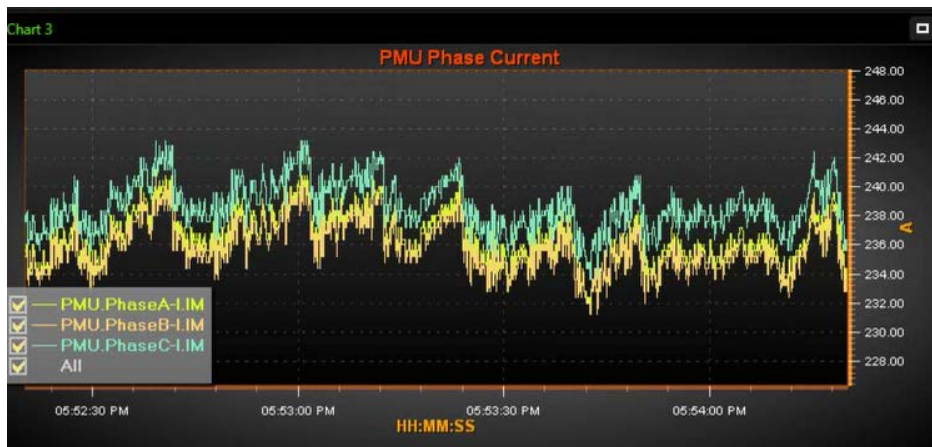
- Team to review February action items:
 - Determining Disturbance Locations Survey – update, share with CRSTT, and other TT leads then send out to industry.
 - NDR and Mike will take another look at updating the Phase Angle Monitoring spreadsheet and possibly update the paper in an effort to keep the CRSTT documents current. ([Download](#) the paper).
 - NDR to check with Peak on sharing an event video – in progress.
 - Teresa to post link to Use Case Document spreadsheet ([Download](#)).
 - New CRSTT Goal discussed: Benchmarking industry use of synchrophasors in the control room.
 - Mike: put language together supporting utilities that assist in the development of business cases; justifying cost, demonstrating the value for developing applications in the control room, etc.
 - Registration for the NASPI Work Group meeting increases on March 26. If you are attending and have not registered please do so to avoid the late fee (<https://www.naspi.org/work-group-meetings>).

Focus Area Documents

1. [System Islanding Detection and Blackstart Restoration](#) –Posted in June 2015.
 - (Kleitsch –ATC, Cassiadoro –TRS)
2. [Using Synchrophasor Data for Voltage Stability Assessment](#) –Posted in Nov. 2015.
 - (Farantatos –EPRI, Vaiman –V&R Energy)
3. [Using Synchrophasor Data for Phase Angle Monitoring](#) –Posted in May 2016.
 - (Cassiadoro –TRS, Nuthalapati -ERCOT)
4. **Enhanced State Estimation Survey** –Preliminary responses received, more analysis needed.
 - (Vaiman –V&R Energy, Kleitsch –ATC)
5. [Using Synchrophasor Data for Oscillation Detection](#) – Posted in February 2018.
 - (Nuthalapati –Peak, Dyer –EPG, Blevins and Rjagopalan –ERCOT, Patel -EPRI)
6. **Determining Disturbance Locations – Survey to be distributed this week with request to respond by 4/30/2018.**
(Dyer –EPG, Zweigle –SEL Inc., Cassiadoro –TRS)
7. **Using Synchrophasor Data to Monitor Reactive Power Balancing**
 - (Cassiadoro -TRS, SCE –A.J, Peak RC –Zhang, Vaiman –V&R Energy)

Video Event Files

Objective – Continue building library of events to demonstrate value PMU data provides when analyzing abnormal events and disturbances.



Video

PMU versus SCADA Video Events [Summary](#). Please refer to EPG's [template](#) and the [Synchrophasor Data File Format .CSV](#) when creating a video event.

Video 1 - Current and voltage oscillations observed on the 138 kV system during testing of new generator controls (65 MW gas turbine).

[RTDMS PMU vs. SCADA Video 1](#)

Video 2 - Voltage oscillations observed on the 230 kV system when a water pump was taken offline.

[RTDMS PMU vs. SCADA Video 2](#)

Video 3 - Voltage oscillations observed following the loss of a 345 kV line during a period of high wind generation.

[RTDMS PMU vs. SCADA Video 3](#)

Video 4 - Real and Reactive Power oscillations observed on the 69 kV system during a period of high wind generation with the plant radially connected (i.e. one of two normal source lines out of service).

[RTDMS PMU vs. SCADA Video 4](#)

Video 5 - Real and Reactive Power oscillations observed during a period of high wind generation.

[RTDMS PMU vs. SCADA Video 5](#)

Video 6 - Real Power and voltage oscillations observed following the loss of a large generator.

[RTDMS PMU vs. SCADA Video 6](#)

Video 7 - Wind farm Oscillation Detection and Mitigation using Synchrophasor Technology

[Wind Farm Oscillation Detection and Mitigation](#)

Video 8 - A 230kV fault followed by a loss of a large generation plant caused system frequency to drop approximately 72mHz momentarily, while having an impact on nearby system voltages and online generators ([Clip 1](#) , [Clip 2](#) , [Clip 3](#))

[Video 9](#) - Please be patient with the download, the video is very large. This video captures the actual synchronization of a large generator to the electric grid. The windows in the visualization tool capture frequency, output power, voltage angle, and voltage magnitude of the generator and at a reference point on the electric grid.

Use Case Documents

Objective – Develop docs that demonstrate ways that grid operators and electric utilities are using synchrophasor data to provide operational value.

| Event ID | Event | Event Category | Entities Involved | Event Description | Extended Description in Related NASPI Technical Paper | Safety Impact | Reliability Impact | Budgetary Impact |
|----------|---|------------------------|-------------------|---|---|--|--------------------|--|
| TE02 | Failing potential transformer | Transmission Equipment | ATC | Abnormal voltage signature found while reviewing PMU data led to discovery of a failing potential transformer which was subsequently isolated and replaced. | p.38 | The utility avoided safety risk to personnel that might have been in close proximity to the PT during its failure. | | Utility avoided costs associated with customer minutes of interruption that would have resulted from the potential transformer's failure had the condition not been identified and a mobile transformer placed in service to facilitate the outages necessary for its replacement. |
| TE03 | Loose connections in potential circuits | Transmission Equipment | OG&E | Fluctuations observed in positive sequence voltage data collected from PMUs led to discovery of a loose fuse connection in a CCVT safety switch. PMU data has been used in a similar fashion to reveal faulty terminations, animal-damaged conductor and contact corrosion. | p.40 | | | Utility avoided costs associated with equipment damage and customer minutes of interruption that might have resulted had the issues not been addressed. |

NASPI Vision and Mission

Vision – Improve power system reliability through wide-area measurement, monitoring and control.

Mission – Create a robust, widely available and secure synchronized data measurement infrastructure for the interconnected North American electric power system with associated analysis and monitoring tools for better planning and operation, and improved reliability.

CRSTT Mission Statement

The CRSTT's mission is to work collectively with other NASPI task teams to advance the use of real-time synchrophasor apps for the purpose of improving control room operations and grid reliability. This team will utilize its experience and regional diversity to provide advice, direction, support and guidance to NASPI stakeholders involved in the development and implementation of real-time synchrophasor apps.

CRSTT Objectives

- Advance synchrophasor applications in the control room environment.
- Provide guidance on best practices.
- Identify issues that impede implementation.
- Ensure synchrophasor-based application training is available to end users.
- Promote operational event analysis to demonstrate the value of synchrophasor technology.

CRSTT Goals

- Develop a series of use case summary docs that define how grid operators and electric utilities are using synchrophasor data to provide operational value.
- Prioritize and complete the remaining focus area documents.
- Create additional video event files for use cases and simulated events.

CRSTT Goals (continued)

- Gather operator feedback on synchrophasor applications (best practices).
- Support the development of synchrophasor-related training for operations staff.
- Develop a series of Lessons Learned documents related to the use of synchrophasor technology in the operations environment.

CRSTT Breakout for April 2018 WG Mtg.

Team to consider topics for discussion at April 2018
NASPI Work Group Meeting.

| Task Team Breakouts |
|--|
| <p>Control Room Solutions Task Team</p> <ul style="list-style-type: none">• CRSTT business• Training System Operators in Synchronized Phasor Measurement Technology by simulating major WECC system events_ Bharat Bhargava, Advanced Power System Technologies; Armando Salazar, Southern California Edison Co• Real Time Applications Using Linear State Estimation Technology_ Ken Martin & Lin Zhang, Electric Power Group• 3-level Measurement Data Validation System_ Alexey Danilin, Pavel Kovalenko, & Viktor Litvinov, GRT Corporation |

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Next NASPI WG Meeting: April 2018 in Albuquerque, NM.

Next NASPI CRSTT Conference Call: May 16, 2018.